[0781] A system for providing product water may include a source tank, containing a volume of source water, and a product tank, containing a volume of product water. Both the source tank and the product tank may include level sensors to determine the level of water. In these embodiments, the control system enters the water task Fill **7506**, etc., states only when there is a sufficient volume of water in the source tank and if the product tank is not full. The water task will then run until either the product tank is full or the source tank is below a predetermined volume. The machine then enters into the Idle **7504** state. In some embodiments, the source tank may be fluidly connected to a pressurizing pump which pumps the water into the apparatus.

[0782] While the principles of the invention have been described herein, it is to be understood by those skilled in the art that this description is made only by way of example and not as a limitation as to the scope of the invention. Other embodiments are contemplated within the scope of the present invention in addition to the exemplary embodiments shown and described herein. Modifications and substitutions by one of ordinary skill in the art are considered to be within the scope of the present invention.

1.-**14**. (canceled)

15. A fluid vapor distillation apparatus comprising:
a source water fluid input;
a blowdown liquid output;
a product water output;
a compressor comprising an intake and an output;
an evaporator condenser apparatus fluidly connected to:
the source water input via a source water valve the blowdown liquid output via a blowdown valve and a blowdown reservoir, the blowdown valve downstream of blowdown reservoir and the blowdown reservoir including a level sensor;
the product water output via a product valve; and
the compressor intake and the compressor output;
the evaporator condenser transforms source fluid into steam and blowdown liquid, the steam delivered to the compressor and transforms compressed steam from the compressor into product water; and
a control system for maintaining a constant flow of blowdown liquid through the output comprising:
a blow down controller varying the duty cycle of a blow down valve based on a signal from the level sensor;
a source flow controller varying the duty cycle of a source flow valve based on the signal from the level sensor.

16. The apparatus of claim **15** further comprising:
at least one controller;
an idle state wherein said at least one controllers are off;
a fill state wherein a source valve is opened and source fluid enters a sump in said fluid vapor distillation apparatus;
a heat state wherein a heater in said sump is maximized until fluid in said sump reaches a predetermined temperature;
a heat exchanger prime state wherein said source valve is opened to a predetermined duty cycle;
a start pump state wherein a bearing feed pump is run at a predetermined speed, and a blow motor is started; and
a run state wherein said fluid vapor distillation apparatus produces product water.

17. The apparatus of claim **15** further comprises a heat exchanger comprising an outer tube carrying source water from source water fluid input and at least one inner tube carrying product water to the product water output, the heat exchanger arranged in a spiral around the housing of said evaporator condenser.

18. The apparatus of claim **17** wherein said heat exchanger further comprising a first end and a second end, with a connector attached to each end, connector on the first end is connected to the product output and the source water input, and the connector on the second end forms a connection to the evaporator condenser.

19. The apparatus of claim **15** wherein said evaporator condenser tubes further comprising:
a substantially cylindrical housing;
a plurality of tubes in said housing, and
packing inside the tubes;
wherein an evaporator section is bounded in part by an interior surface of the plurality of tubes and a condenser section is bounded in part by the exterior surface of the plurality of the tubes and the housing.

20. The apparatus of claim **19** wherein said packing is a rod.

21. The apparatus of claim **19** wherein said evaporator condenser further comprising a steam chest fluidly-connecting the evaporator section to the compressor intake.

22. The apparatus of claim **15** wherein said compressor further comprising an impeller assembly driven by a magnetic drive coupling.

23. The apparatus of claim **15** wherein said control system comprising at least two processors, a motor control engine processor and an ARM processor.

24. The apparatus of claim **15** wherein said fluid vapor distillation apparatus further comprising a conductivity meter and a conductivity cell to determine the conductivity of the product fluid.

25. A fluid vapor distillation apparatus comprising:
a source fluid input;
a compressor;
an evaporator condenser apparatus comprising:
a substantially cylindrical housing; and
a plurality of tubes in said housing,
wherein an evaporative section is located inside the plurality of tubes and a condenser section is located between the tubes and said housing, said source fluid input is fluidly connected to said evaporator section where source fluid is transformed into steam and delivered to the compressor and the said condenser section transforms compressed steam received from the compressor into product fluid;
a vent valve fluidly connected to the condenser section;
a temperature sensor located evaporative section; and
a control system for controlling said fluid vapor distillation apparatus comprising a vent controller that is configured to open and close the vent valve and receives a temperature signal from the temperature sensor.

26. The apparatus of claim **25** wherein said control system for controlling said fluid vapor distillation apparatus further comprising:
at least one controller;
and operating states including:
an idle state wherein said at least one controllers are off;
a fill state wherein a source valve is opened and source fluid enters a sump in said fluid vapor distillation apparatus;